21 May 2009

By: Tudor Vieru, Science Editor

# Hyperspace DVDs Will Hold 140 Times More Data

*They will encode laser wavelength and polarization too*

Future discs will encode information in four dimensions
Wikimedia Commons

Standard-sized DVDs and BluRay discs could soon be made obsolete at their tens of gigabytes of data storage capacities, by a new, highly expected type of storage medium, which is currently under development in Australia. Rather than encoding the data stream in just two dimensions, such as in conventional systems, the new disc, which will be the same size as existing ones, will encode it in four dimensions, adding the polarization and wavelength of the laser writing the data to the equation.

However, one of the main difficulties that beset the team of experts working on the new project from the get-go was the lack of a material able to store so many information of so many types. Expert James Chon, from the Australian Swinburne University of Technology, seems to have discovered a solution to this problem very quickly. With his background in nanotechnology, he realized that gold, rod-shaped nanoparticles of different sizes and orientations could provide the perfect storage medium for the new type of data. According to expectations, the new discs will hold up to 140 times more information than the best BluRay discs currently developed.

"When my colleague Min Gu first suggested the idea, he had no idea if such a material existed. Luckily, my background is nanoparticles, and I knew of the perfect fit," Chon said, quoted by Nature News. "Polarized light only 'sees' and records on a subset of the nanorods. Change the polarization and you can record on the same volume as though it is a whole new recording medium." The way these nanorods respond to light polarization is actually very simple - when light of a certain polarization hits those gold structures that are angled in a certain position, they melt them and create spherical constructs. These are similar to the 1 and 0 holes that are found on average CDs.

"Depending on the number of polarizations and colors of light you use, you have a number of different channels to record on," Chon added. The varying length-to-width ratio that the gold nanorods have is essential in determining their response to polarization and laser wavelength. In prototypes, DVD-sized discs were able to hold 1.6 terabytes of data, after the material was inscribed using two laser polarizations and three colors. The team hypothesizes that, by introducing another polarization, the capacity could be increased to about 7.2 terabytes. The best BluRay holds just 50 gigabytes.